COLLOQUE DE PHYSIQUE EPFL

EPFL PHYSICS COLLOQUIUM

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Room CE1

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Quantum simulations: from condensed matter to high energy models

Many-body quantum systems are very hard to describe and simulate in general, since the dimension of the state space grows exponentially with the number of particles, volume, etc. Cold atoms in optical lattices as well as trapped ions may help us in that task, as one can engineer the interactions among the atoms in order to emulate many-body quantum problems. In this talk I will briefly summarize proposals to simulate condensed matter as well as high energy physics models with those systems. I will also show how photonic crystal structures can be used to design subwavelength optical lattices in two dimensions for ultracold atoms, potentially achieving a better performance than current experimental set-ups.

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